MULTIMEDIA UNIVERSITY

STUDENT ID NO

MULTIMEDIA UNIVERSITY

FINAL EXAMINATION

TRIMESTER 1, 2017/2018

MMA2013 – INTERACTION DESIGN

(All sections / Groups)

23 OCTOBER 2017
9.00 AM – 11.00 AM
(2 Hours)

INSTRUCTIONS TO STUDENTS

1. This question paper consists of **FIFTEEN** pages.
2. Answer all questions in **Section A.**
3. Answer **TWO** of the **THREE** questions in **Section B.**
4. Answer **THREE** of the **FOUR** questions in **Section C.**
5. Please write all your answers in the Answer Booklet provided.

SECTION A [10 MARKS]

Instructions: Answer **all questions** in this section.

1. Which of the following is **incorrect** about feedback in Human-computer interaction based on Cybernetics theory in 1950's? (2 marks)
   A. A circulation loop between input and output
   B. A circulation between instruction and action
   C. A transaction between multiple machines
   D. An optimal communication among humans
   E. A one-directional loop between machines

2. Which of the following explanation is **incorrect** about the changes made in 1980's in interaction design field? (2 marks)
   A. Scientists and inventors were the majority of users.
   B. Middle scale companies were capable to deploy computers in their working place.
   C. Discretionary user became important in the market.
   D. Psychologists entered and played important roles.
   E. Apple Lisa was announced.

3. Which of the following is **incorrect** about historic innovations in interaction design? (2 marks)
   A. Apple Macintosh was the one of first GUI successes in market.
   B. Xerox Palo Alto Research Center made a first GUI oriented prototype for personal computing in 1973
   C. Vannevar Bush designed MEMEX based on the concept of electronic linking of material.
   D. Sketchpad by Ivan Sutherland was a hypothetical concept using the idea of Objet-Oriented Programming.
   E. In 1968 Dr. Douglas Engelbart introduced the direct manipulation of dataspace with a mouse.

4. What are the two fundamental calculations in electronic digital computer enabled by binary number system? (2 marks)
   A. Conditional and batch calculations
   B. Multitasking and time-sharing calculations
   C. Iterative and singular calculations
   D. Analytical and heuristic calculations
   E. Logical and arithmetic calculations

5. What is the definition of algorithm? (2 marks)

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SECTION B [10 MARKS]

Instructions: Answer only **2 questions** out of 3 in this section.

QUESTION 1 [5 MARKS]

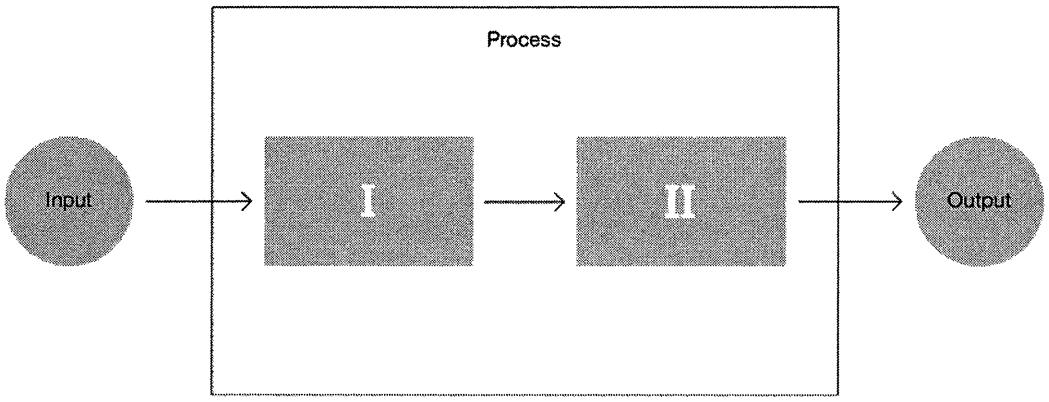

Figure 1 Design process archetype after Koberg and Bagnall (1972)

1.1 Which of the following group is appropriate to describe activity in I and II in **Figure 1**? (2 marks)

A. I – Networking, II – Collaboration
B. I – Analysis, II – Synthesis
C. I – 1st order processing, II – 2nd order processing
D. I – Ideation, II – Visualization
E. I – Observation, II – Participation

Good design starts with an understanding of psychology and technology. Good design requires good communication, especially from machine to person, indicating what a.___, what b.___, and what c.___. Norman, D. (2013). *The Design of Everyday Things: Revised and Expanded Edition* (Revised Edition edition). New York, New York: Basic Books. P.8

Table 1 The requirement of good design by Don Norman

1.2 Complete the last sentence in **Table 1** with appropriate words for the blanks a, b, c. (2 marks)

Continued ...

1.3 Which of the following is **incorrect** about the arguments on interaction design by Don Norman in his publication, *The Design of Everyday Things* (1988)? (1 marks)

A. Design with technology are easy to fail because engineers who are experts in technology but limited in their understanding of people.
B. The way how a product work needs to be discoverable by its users.
C. Experience design, industrial design, interaction design have different area of focus.
D. Human-centered design focuses on highly-developed sensing technology.
E. Good design requires an understandings of humans.

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QUESTION 2 [5 MARKS]

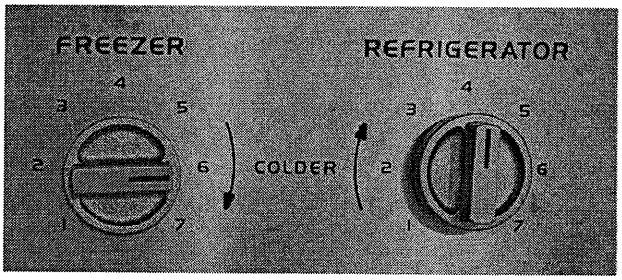

FIGURE 1.9. Refrigerator Controls. Two compartments—fresh food and freezer—and two controls (in the fresh food unit). Your task: Suppose the freezer is too cold, the fresh food section just right. How would you adjust the controls so as to make the freezer warmer and keep the fresh food the same? (Photograph by the author.)

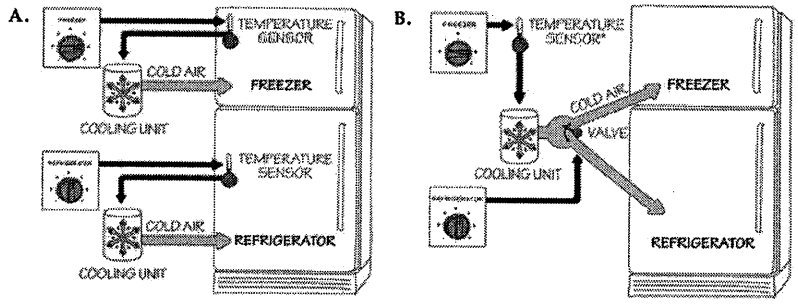

FIGURE 1.10. Two Conceptual Models for a Refrigerator. The conceptual model A is provided by the system image of the refrigerator as gleaned from the controls. Each control determines the temperature of the named part of the refrigerator. This means that each compartment has its own temperature sensor and cooling unit. This is wrong. The correct conceptual model is shown in B. There is no way of knowing where the temperature sensor is located so it is shown outside the refrigerator. The freezer control determines the freezer temperature (so is this where the sensor is located?). The refrigerator control determines how much of the cold air goes to the freezer and how much to the refrigerator.

Table 2 A case study by Don Norman in his publication, The Design of Everyday Things (1988) P.25-31

2.1 Which of the following is **correct** about the case in **Table 2**? (1 mark)

A. The signifier in Figure 1.9 is equivalent to the structure in Figure 1.10B.
B. The conceptual model failed to allow the author predict the effects of his action.
C. There is an immediate feedback after the adjustment of temperature.
D. The controls in Figure 1.9 suggest a complete implementation model.
E. The implementation model and conceptual model is identical.

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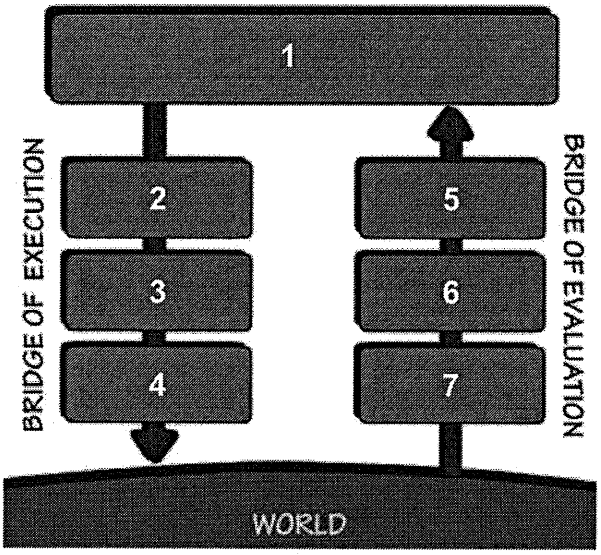

Figure 2 The seven stages of action cycle

2.2 Write a correct sequence of seven stages of action cycle by Don Norman (1999) with the given actions below. (2 marks)

2.3

F. Compare	J. Goal
G. Plan	K. Specify
H. Perceive	L. Perform
I. Interpret	

Continued ...

2.3 What is the concept of the description below? (1 mark)

> This is some way of letting you know that the system is working on your request. When it is poor, it can be worse than not to have it at all, because it is distracting, uninformative, and in many cases irritating and anxiety-provoking.

A. Affordances
B. Signifiers
C. Constraints
D. Mappings
E. Feedback

2.4 What is the concept of the description below? (1 mark)

> This is a technical term, borrowed from mathematics, meaning the relationship between the elements of two sets of things.

A. Affordances
B. Signifiers
C. Constraints
D. Mappings
E. Feedback

Continued ...

QUESTION 3 [5 MARKS]

3.1 Which of the following is **incorrect** about *the fundamental principles of interaction* discussed by Don Norman in his publication, *The Design of Everyday Things* (1988)? (1 marks)

A. The physical objects convey important information about how people could interact with them, "affordance."
B. The term affordance refers to the relationship between a physical object and any interacting agent even including human and animal.
C. Signaling components of affordance are signifiers.
D. Signifier means visual marks.
E. In design, signifiers are more important than affordances.

3.2 Which of the following is **incorrect** *about the conceptual model of interaction* discussed by Don Norman in his publication, *The Design of Everyday Things* (1988)? (2 marks)

A. A conceptual model is an explanation of how something works.
B. A conceptual model doesn't have to be complete or even accurate as long as it is useful.
C. The major clues to conceptual model come from their perceived structure—in particular from signifiers, affordances, constraints, and mappings.
D. Conceptual model always prevents poor interaction.
E. A conceptual model is the representation of how a machine or application would be from the user's vision.

3.3 Which of the following is **correct** about the comparison between *subconscious* and *conscious* systems of cognition in everyday action? (2 marks)

A. Subconscious thought is automatic.
B. Subconscious thought is slower than conscious one.
C. Subconscious thought has limited resources than conscious one.
D. Subconscious thought has highly capable of symbolic manipulation through a sequence of steps.
E. Subconscious thought is poor at recognizing the relationship between what we now experience and what has happened in the past.

Continued ...

SECTION C [20 MARKS]

Instructions: Answer only 2 questions out of 3 in this section.

QUESTION 1 [10 MARKS]

1.1 Which of the following is **correct** about electricity? (2 marks)

A. Actuators converts electrical energy into other forms of energy.
B. Electricity is a visible form of energy.
C. Electrical circuit is a component to convert electrical energy.
D. Electrical current is the amount of potential energy between two points on circuit.
E. Transducer converts other forms of energy into electrical energy.

1.2 Which of the following is also **correct** about electricity? (2 marks)

A. Conventional flow of electrical current is from negative to positive.
B. Resistance is a material's tendency to resist the current on circuit.
C. The amount of electrical currents doesn't damage the components on circuit.
D. Ohm's law defines the relation between voltage, current, and power.
E. The flow of electric charge caused by the movement of atoms.

1.3 Which of the following electrical component does allow electrical current only in single direction? (2 marks)

A. Pushbutton
B. Breadboard
C. Resistor
D. Potentiometer
E. Diode

1.4 Which of the following is **incorrect** about the **Figure 3**? (2 marks)

A. Conventional flow of electronic current is clockwise.
B. The amount of current on the point C is 0.5 mA.
C. The amount of current on the point C is proportional to voltage.
D. The amount of current on the point C is bigger than the left side of circuit.
E. The amount of current on the point C is inversely proportional to resistance.

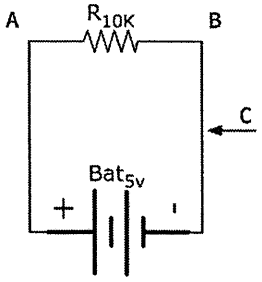

Figure 3

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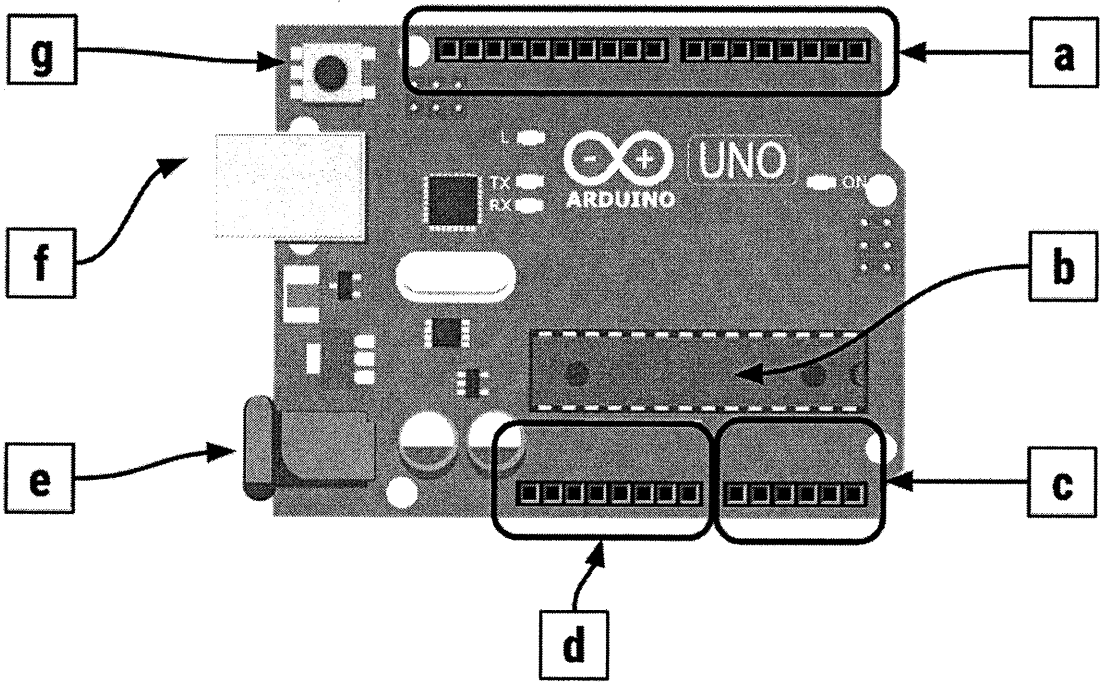

Figure 4 Arduino Uno rev. 3

1.5 Match the component names below with the alphabet in **Figure 4**. (2 marks)

i. USB port
ii. Analog Pins
iii. GND and 5v pins
iv. Reset Button
v. Digital IO pins
vi. Power Connector
vii. Microcontroller

Continued ...

QUESTION 2 [10 MARKS]

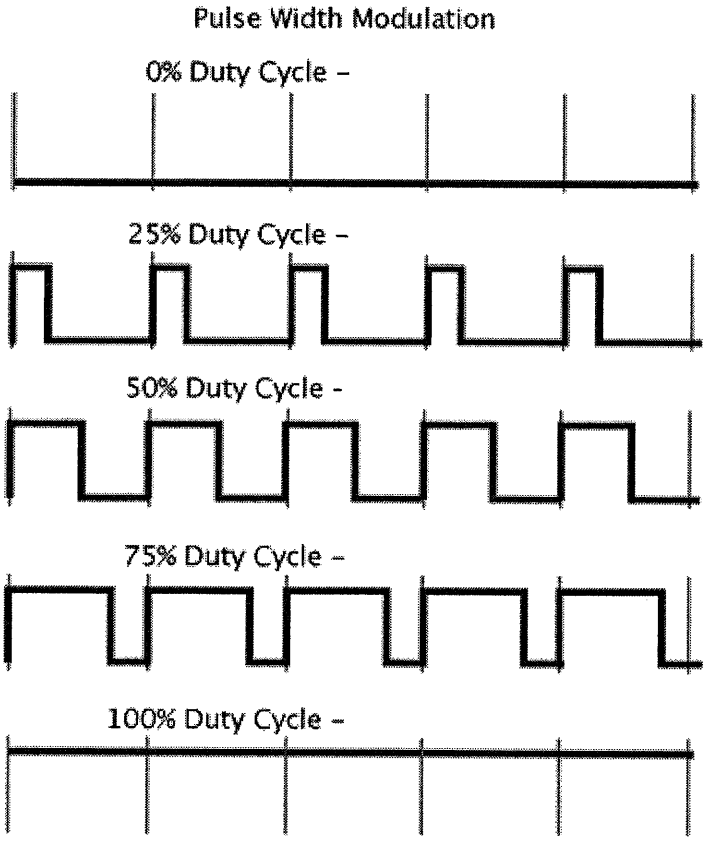

Figure 5

2.1 Which of following is **incorrect** about PWM (Pulse Width Modulation) in **Figure 5**? (2 marks)

A. PWM is a technique for getting analog signal results with digital means.
B. PWM is enabled with a repetition of on-off pattern.
C. It simulates a steady voltage between 0 and 5v.
D. Analog Write () writes the value of duty cycle ranging from 0 and 1023.
E. Only limited number of digital pins are compatible with PWM on Arduino Uno.

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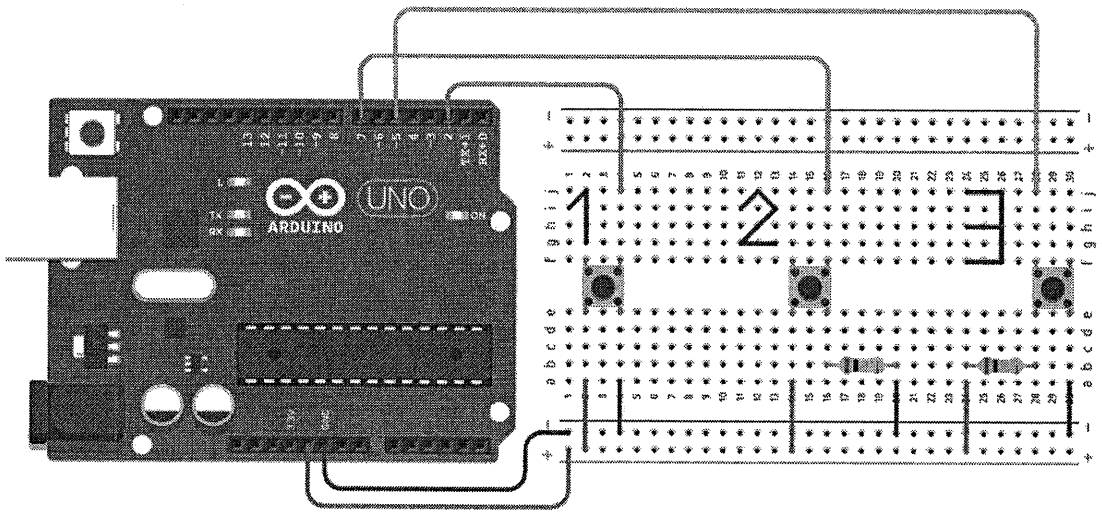

Figure 6

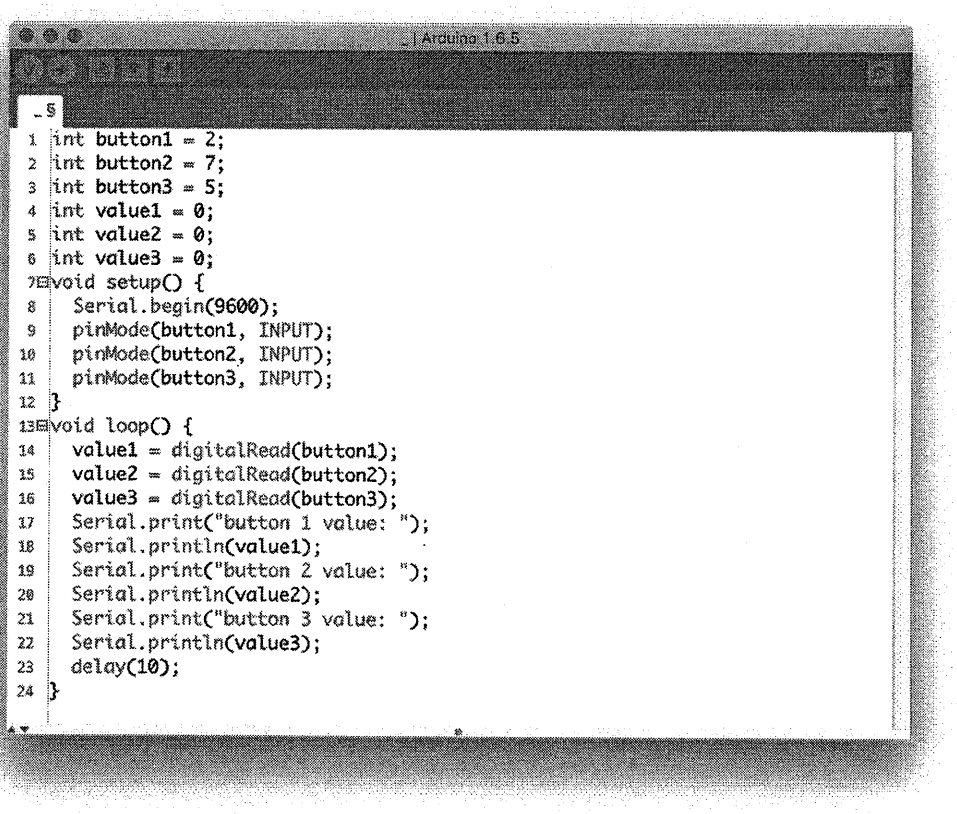

Figure 7

Continued ...

2.2 Which of following is **incorrect** about the circuit in **Figure 6**? (2 marks)

A. Digital Pin Number 5 supports Pulse Width Modulation.
B. When button 3 is pressed *value3* will be equal to 0.
C. Button 1 is floating.
D. The code on line number 20 controls button 2.
E. The code on line number 23 stops the execution of this program for 10 milliseconds.

2.3 Which of following is **incorrect** about the circuit in **Figure 6** and **Figure 7**? (2 marks)

A. The values of two variables, value2 and value3 are always identical.
B. The voltage input for this circuit is 5 volts.
C. This board has 6 digital pins that can be used for pulse width modulation.
D. 3 digital pins are activated to receive signals.
E. Line number 8 is for communication between this Arduino board and computer.

2.4 Rewrite the code in **Figure 7** to execute the following algorithm. You are required to write down every single line of code. (4 marks)

1. Test to see the button 2 is pressed.
2. While the button 2 is pressed, turn on the LED on Arduino board.
3. While the button 2 is not pressed, turn off the LED on Arduino board.
4. Repeat indefinitely.

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QUESTION 3 [10 MARKS]

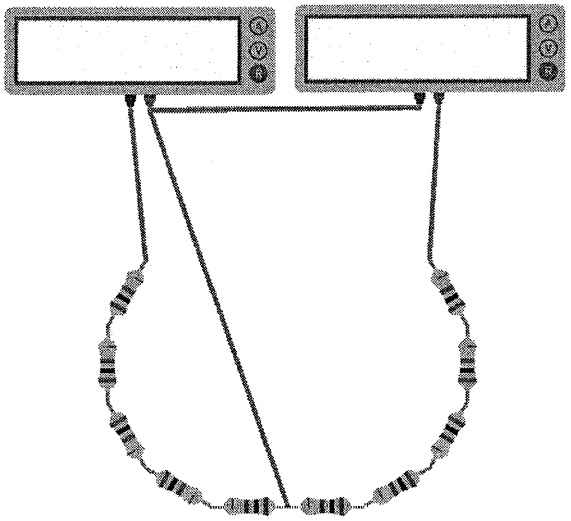

Figure 8 Two multimeters with ten 100Ohm resistors (100Ohm x 10)

3.1 Which of following groups is correct pair of measured value from two multimeters in **Figure 8**? (2 marks)

A. 0 Ohm – 0 Ohm
B. 1000 Ohm – 0 Ohm
C. 500 Ohm – 500 Ohm
D. 0 Ohm – 1000 Ohm
E. 1000 Ohm – 1000 Ohm

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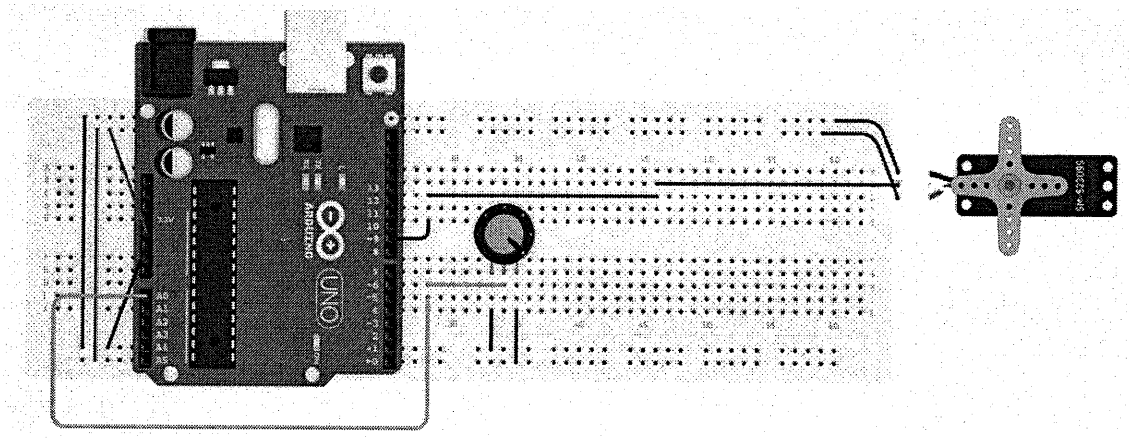

Figure 9

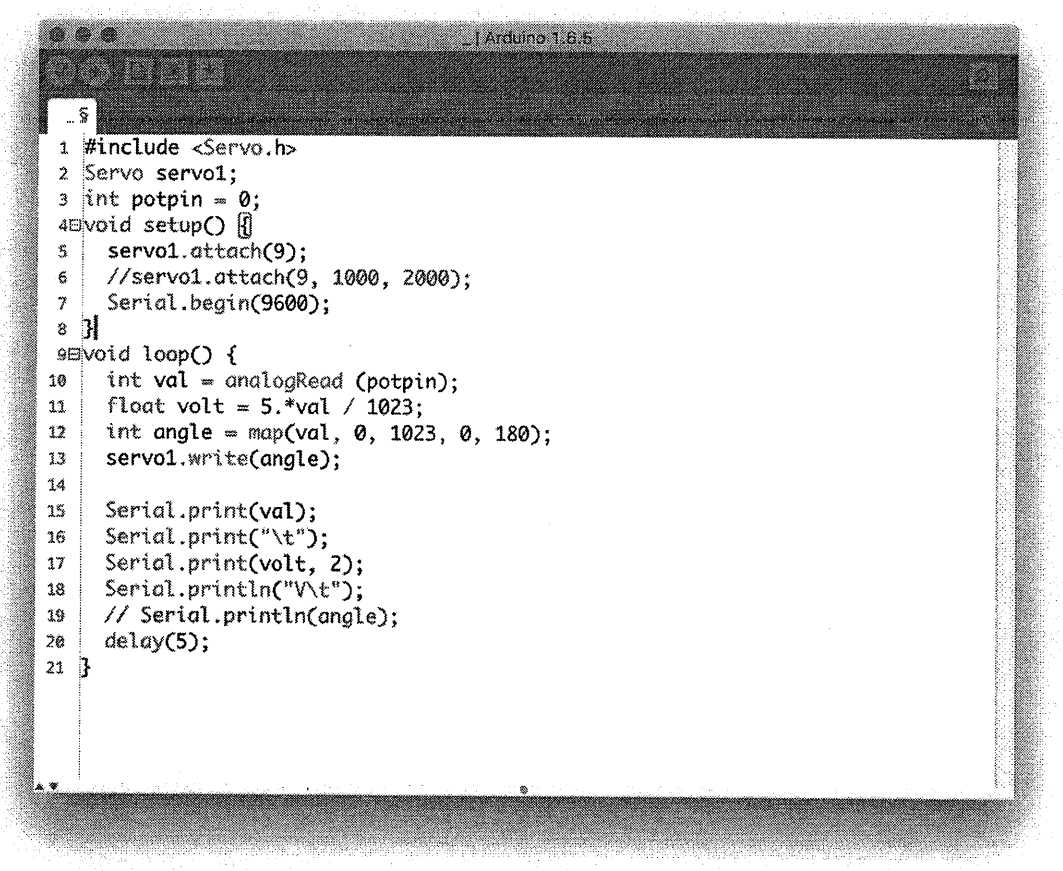

Figure 10

3.2 Which of following groups is **correct** pair of transducers in **Figure 9**? (2 marks)

A. Light bulb—DC motor
B. Neopixel – DC motor
C. Potentiometer—Servo motor
D. Potentiometer—Duty motor
E. Diode—DC motor

3.3 Which of following is **incorrect** about the code in **Figure 10**? (2 marks)

A. The code utilized the external library to extend its capability.
B. The code on line 3 is to access to one of the components.
C. The circuit will work as planned without USB cable if there is a stable power supply.
D. The algorithm is same after the deletion of line number 11.
E. The variable angle has no effect on the algorithm.

3.4 Rewrite the code in **Figure 10** to execute the following algorithm. You are required to write down every single line of code. (4 marks)

1. Test the angle of rotation from the potentiometer (or knob).
2. The micro servo rotates its wing clockwise in proportion to the angle of knob.
3. The Arduino onboard LED blinks in proportion to the angle of knob.
   a. When the angle is at its minimum position, let the LED blink every 2.5 seconds.
   b. When the angle is at its maximum position, let the LED blink every 0.5 seconds.
   c. If the knob is in between minimum and maximum, the LED blinks in proportion to the angle of knob ranging from 2.5 to 0.5 seconds.
4. Repeat this procedure.

End of Paper.